



COLONY OF SIERRA LEONE

ANNUAL REPORT
OF THE
Department of Agriculture
FOR THE YEAR
1945

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The Annual Report of the Department of Agriculture, for 1945.

SIR,

I have the honour to submit my report for the year 1945.

SECTION I—INTRODUCTION AND POLICY

2. The drive for maximum food production for local consumption has of necessity continued to receive priority but, with the return of more normal conditions in view, steps are being taken to resume work which had to be neglected during the war years. Future activities will include greater attention to soil conservation measures, the establishment of stable systems of agriculture, and the development of existing and, if possible, new export crops.

3. The 1944/45 rice crop was fortunately a good one and this combined with the reduction of labour required for Services and other emergency works in the Freetown area greatly eased the local food situation. During the year under review there was no scarcity of essential foodstuffs; and prices, although still very high, were definitely on the down grade. The 1945/46 rice crop and all subsidiary food crops were satisfactory in spite of the very heavy rainfall experienced in August, when exceptional floods caused damage throughout the country as a result of which some individual farmers suffered very serious losses. The damaged farms, however, constituted a very small proportion of the aggregate, and the total production of rice and other foodstuffs was at least up to that of the previous good season.

4. The distribution of swamp seed rice was continued under departmental and native administration schemes. The amount, although large, was a reduction on that of recent years, as most districts are now well supplied with seed; distribution in future will normally be confined to selected seed only. There was an encouraging increase in the number of native administration seed farms, the functions of which include multiplication and distribution of varieties of rice most suited to varying local conditions. The distribution of seed and planting material of subsidiary food crops, including fruit and vegetables, was maintained; and the distribution of ornamentals, which had been discontinued during the war years, was resumed.

5. There was a decrease in the export tonnages of nearly all agricultural products. This was due partly to pre-occupation with food crops which gave a better return than export products and partly to the serious shortage of consumer goods. During the war years, several factors, including the diversion of the produce inspection staff to other duties in addition to inspection, resulted in a serious decline in the quality of export produce, and of piassava and ginger in particular. Steps have now been taken to remedy this. Additional inspectors were appointed with a view to enforcing stricter inspection at the buying point and at the ports, and instructors were posted to the piassava and ginger producing areas to demonstrate correct methods of preparation.

6. A notable feature of 1945 was the submission of the Department of Agriculture's plan for post-war development, and the application, since provisionally approved, for grants (under the Colonial Development and Welfare Act) to finance the following new projects:—

Scarcies rice research station, new stock farm, new general experimental station, horticultural and poultry stations, experimental mechanical cultivation, agricultural engineer, new laboratory block for the specialist officers, and the appointment of three additional agricultural officers for rehabilitation and soil conservation work. Adequate provision was allowed for the additional European and African staff required to implement these different projects.

7. There has been no radical change in the policy of the department. I give below the policy approved by Government and a summary of the more important work initiated or extended during the year:—

A.—THE ADEQUATE PROVISION OF FOOD FOR THE PEOPLE

This is to be accomplished by:—

1. The improvement and spread of swamp rice cultivation to such an extent that not only will the needs of the people be supplied in a bad year but there will be a surplus for export in ordinary years.

Work initiated or extended in 1945:—

(i) Swamp reclamation—Under the Ribbi-Bonthe mangrove clearing schemes, 930 farmers have now received loans totalling £4,032 and have cleared 4,550 acres of which some 3,300 acres have been planted with rice. During the year concentration was upon consolidating and extending existing farms rather than upon starting new farmers. A conservative estimate of farmers clearing without financial help is 120, with 500 acres cleared.

(ii) The large-scale cultivation of inland swamps by communal effort, adopted as a war-time measure, had led to indifferent husbandry and low yields per acre and was not popular with the majority of farmers. Consequently in 1945 it was decided to concentrate upon getting keen individual farmers however small in number, established in swamps under supervision. It was thought that this method would be productive of better cultivation and better yields per acre than mass production methods. Results are encouraging and figures so far available, from three districts only, show that 2,063 individual farmers grew rice in 1945 in the former communal swamps.

(iii) In the Northern Divisions, a scheme has been formulated, at first on a limited scale, whereby the initial cost of clearing swamps will be borne by a grant from the Protectorate Mining Benefits Fund. The cleared land will then be divided into one-acre plots which will be rented to farmers. This scheme should be in full progress in 1946, and if it is a success it is hoped that this method of encouraging swamp development will be widely adopted by the native administrations.

(iv) In the saline mangrove swamp at Wellington, near Freetown, test plots were planted through the area, some 80 acres in extent, which had been cleared by the Forestry Department to provide firewood and subsequently partially empoldered and drained as an anti-malarial measure. The rice grew well, giving an average yield of about 31 bushels. Investigations will be continued in 1946, and, if the 1945 results are confirmed, it is intended to go ahead with

the reclamation of these mangrove areas, as their development for rice and other food crops would provide most valuable alternative farm land for the people farming the adjacent uplands which are now in an advanced state of degradation.

(v) Distribution of swamp rice seed was continued under departmental and native administration schemes, but on a much reduced scale. Thus, compared with the record 1944 total of 23,477 bushels, only 11,215 bushels were distributed in 1945. This is in accordance with the post-war policy which is to restrict seed distribution to a scale that will permit adequate supervision and the issue of none but high quality seed of varieties which have been proved to be the best for varying local conditions.

II. The better cultivation of inland swamps and valleys for rice during the wet season and crops other than rice during the dry season.

The good work done during past years to encourage farmers to make increased use of inland swamps has been continued with noticeable effect.

Already, in the town swamps at such places as Makeni and Magburaka, and in the valley farms in the environs of Freetown, town refuse has been used for many years in intensive dry season market gardening. Propaganda and visual demonstration at Government and native administration farms in the use of composts and town refuse is gradually extending the use in swamps of these readily available fertilizers.

The steady continuous propaganda and distribution of improved planting material from departmental farms over a period of several years are having marked effects on the growing in swamps of dry season cassava, sweet potatoes, yams, groundnuts (Kono variety) and native vegetables.

Preliminary trials with Nigerian onions show that they grow well in swamp lands during the dry season. If seed can be produced locally there should be a successful future for this crop.

III. The extension of garden and small-field crops to serve as an auxiliary food supply.

No new work, but the distribution of planting material has been continued and is doing much to ensure a balanced and varied diet amongst a predominantly rice-eating people.

IV. The selection (or introduction) and distribution of seeds and plants suitable for I, II and III.

The main new introductions on trial during the year were onions, soya beans, short-season beniseed and "yawa" cowpeas from Nigeria; and rice varieties from French Guinea and India. The distribution of introduced varieties of rice, yams, cassava and sweet potatoes, previously proved successful, was continued.

V. The improvement of livestock.

Cattle.—Work at Teko stock farm was unfortunately severely curtailed by an outbreak of contagious Bovine Pleuro-pneumonia, but, despite this, the selection by milk yields continued. Individual cows have yielded more than double their 1944 yields whilst there was a general all-round improvement. The first results of feeding trials was the fixing of a standardized ration for young calves using local foodstuffs.

The veterinary officer continued investigation into cattle diseases and established several inspection points in the main northern cattle areas.

At Njala there is a flourishing herd which has remained free from any serious disease. A stall-feeding versus free grazing experiment was started. Grazing trials with Guinea grass (*Panicum maximum*) and Elephant grass (*Pennisetum purpureum*) continued. Results confirmed 1944 conclusions that Guinea grass is outstandingly better than Elephant grass on the uplands. Similarly, the best legume, either as cover crop, cut fodder or grazing, was *Pueraria Phaseoloides*. Trials are to be made introducing short and creeping grasses between the stands of Guinea grass and Elephant grass. Trials were also started with dry season swamp pastures. The natural grass in many inland swamps is *Panicum laxum*, which when close-grazed gives an excellent fresh pasture in damp swamps throughout the dry season. Elephant grass and Guinea grass are being tried in the swamps for comparison with *Panicum laxum*.

Butter Production.—For the first time butter was produced at Teko stock farm for local consumption. The quantity, 332lb, was small, but represents a satisfactory beginning.

Pigs.—1945 results at Njala and Newton were most encouraging. The stock at both places was severely culled to eliminate native blood, and in future, concentration will be on English blood. With proper management and feeding, pure-bred English pigs give a greater weight increase at a quicker rate than do native cross-breeds under the same treatment and appear to be just as hardy. At Newton the stock is now largely the progeny of Large White and Middle White crosses, whilst at Njala the stock is entirely Berkshire. It is hoped, in 1946, to import Large Whites from Nigeria so that a comparison can be made between this breed and Berkshire's.

There is a steady demand, particularly in the Colony area, for all available improved breeding-stock. It is hoped to develop a controlled distribution of pure-breeds to selected farmers in the Colony during 1946. No pigs will be distributed unless they can be housed, managed and fed on lines laid down by the department.

Sheep.—Experience with the local sheep over several years at Njala and Teko indicate that they are completely uneconomical, under any treatment. They are of poor conformation, slow growing and very subject to disease.

Small livestock.—Concurrently with the policy of developing small holdings and market gardens a small trial introduction of rabbits of the Belgian hare and Angola types, was made (by Mrs. Roach) at Newton. The experiment is proving successful and foundation stock is being provided for other stations. In 1946, as for pigs, a controlled distribution is to be made to selected Colony market gardeners. Eventually rabbits should provide a useful addition to the meat supplies of the people.

Poultry.—The distribution of pure and cross-bred Rhode Island Red poultry and eggs continued, with Njala as the main distributing centre. In future Njala will concentrate on the production of pure-bred stock, and new imports are expected from South Africa and England during 1946.

B. THE CULTIVATION OF MONEY CROPS AND THE EXPLOITATION OF WILD TREES FOR EXPORT PURPOSES.

The main export crops continued to be palm kernels, piassava, ginger and cocoa whilst for the first time husk rice was exported, as an emergency measure, to Nigeria. Export figures for 1945 were:—

<i>Palm Kernels</i>	...	47,314 tons	<i>Cocoa</i>	...	...	352 tons
<i>Piassava</i>	...	1,170 "	<i>Husk Rice</i>	...	...	1,100 "
<i>Ginger</i>	...	967 "				

With the exception of rice these figures are all less than those for 1944, and considerably less than pre-war figures. The reasons for these decreases are various. In the case of kernels, the scarcity of consumer goods and their greatly increased cost, compared with kernel prices, is the main factor. Thus, whereas such essential consumer goods as hardware and cloth by the time they reach the producer have risen anything up to 200 per cent above pre-war prices, the price for kernels is little different from that paid prior to 1939. The farmer naturally turns to more remunerative crops. During the war piassava, cocoa and ginger were non-essential and their production and export were limited. Towards the end of 1945 steps were taken to revive these export crops. Staff was allocated to give instruction in better preparation and to ensure more stringent produce inspection. There is reason to expect that by the time these commodities are required in maximum quantities a high-grade exportable product will be available. Trials with Angola, Deli and Nigerian oil palms continued at Njala. All are better than the indigenous local varieties, but Angola is outstanding both from weight of fruit per tree and percentage of pericarp oil. A multiplication plot of selected Angola palms is now coming into bearing at Njala, and will be used to meet the heavy and increasing demand for planting material of improved palms.

In the latter years of the war, as a result of war demands, attempts were made to start an export in rattans. Surveys and trial purchases showed that rattans existed in considerable quantities in the high bush areas of Kenema and that an industry could be built up. However, with the war ending, and the probability of normal high-grade rattan production being resumed in the East, the demand for Sierra Leone rattans appears to have ceased. Samples were sent to the United States of America for report, which is awaited.

C. THE ARRESTING OF THE DEGRADATION OF THE FOREST GROWTH OF SIERRA LEONE OR AT ANY RATE INCREASING THE REGENERATION PERIOD BETWEEN SUCCESSIVE BUSHINGS OF THE SAME AREA.

By the mangrove clearing and seed rice distribution schemes, and by the establishment of inland swamp farmers, the normal work of the department continued to encourage farmers to reduce upland cultivation and lessen the rate of destruction of forest growth. This, in itself, however, in relation to the magnitude of the problem, is limited and inadequate. With at least 90 per cent of the farming population still persisting in upland "shifting cultivation" and annually degrading large areas of bush, propaganda and voluntary schemes cannot produce any immediate large-scale effect, and some measure of compulsion is necessary. Legislation given wide powers to restrict upland farming by reserving certain areas to forest and bush is essential. Such legislation has been initiated by the Forestry Department, and in 1945, a start was made in one of the Chiefdoms (Nongowa) in the Kenema district in which the native administra-

tion was empowered by law to conserve considerable tracts of hillsides and land bordering roads and rivers. These "soil conservation areas" were delineated on the advice of the Forestry and Agricultural Officers concerned. As a preliminary trial it is proving a success, and has been readily accepted by the local people. It is hoped that similar legislation will be brought into force on a wider scale in all parts of the country as soon as circumstances permit.

D. THE IMPROVEMENT IN THE PREPARATION AND MARKETING OF PRODUCE

With the revival of post-war trade demanding a high standard of quality, augmented staff was posted to the ginger and piassava producing areas to give demonstrations and instruction in the correct methods of preparing these products. These measures resulted in a marked improvement in quality.

E. THE PRESERVATION OF THE STANDARD OF EXPORT PRODUCE BY INSPECTION

Towards the end of the year, with the staff position easier, it was possible to effect a considerable reorganization and improvement in inspection of kernels, ginger and piassava. It has been found, however, that the present Native Produce Ordinance and Rules are far from adequate, and they will be replaced as soon as possible by new and improved legislation. The widespread system whereby most produce is bought by middlemen, whose chief object is tonnage at lowest prices, is inimical to the improvement of quality. In the same way, Produce Inspection legislation framed so that there is no onus on the producer does not have the necessary educative effect at the source of production.

F. CO-OPERATION WITH THE EDUCATION DEPARTMENT WHERE POSSIBLE IN THE TEACHING OF AGRICULTURE

Njala Training College, since its inception in 1939, has trained 32 Agricultural Instructors. Fourteen new agricultural students completed the first year of the course during 1945. The educational standard of entrants is increasing each year, and it is now possible to select a better type of youth who can take full advantage of the benefits to be derived from a comprehensive course.

G. RESEARCH

With the Plant Pathologist on leave or engaged in administrative duties for most of the year, and no Chemist yet appointed, the only work possible on any scale has been that of the Entomological section. Here, Mr. Wellington, laboratory assistant, has continued to do good routine work in connection with Citrus Moth Investigation and the control of citrus and cattle pests. Rice breeding and selection work continued at Rokupr, and preliminary trials with fodder crops and pastures were started or continued at several stations.

H. CONSERVATION OF SOIL

In Kenema district, concurrently with the voluntary settlement of rice farmers in inland swamps, the first large-scale reduction in upland farming is being made by legislative measures. The native authorities in the Nongowa chieftdom have been given powers to delineate certain upland areas enclosing hills, rivers and roads on the advice of the Forestry and Agricultural Officers concerned. Within these "soil conservation areas" it has been made illegal to farm without official permission. The first reactions of farmers have been favourable and the scheme is working well.

I. NUTRITION.

The continued distribution of a wide variety of garden and farm planting material, including fruit trees and oil palms yielding fruit with a high percentage of pericarp oil, and poultry and eggs; the first manufacture of butter; the introduction of rabbits and the successful rearing of pigs; are all steps towards an improved diet. The development of dry season crops, other than rice, and the steady expansion in vegetable and market gardening during the past decade have come to stay, and in most parts of the country there is now no lack of varied food crops. The chief shortage is animal protein. This is reflected in the high prices readily paid for meat, fish, poultry and eggs. Improvement in this direction is likely to be gradual but could be accelerated by developing the local fishing industry and by a wider distribution of dried or preserved fish. The eradication or control of diseases of livestock and poultry by the Veterinary Department, as yet in its infancy, must be the basis for any livestock improvement schemes. Meanwhile, details of rearing, management, feeding and breeding of cattle, pigs, rabbits and poultry are being investigated at the Agricultural Department's stations.

J. EXTENSION WORK. ALL EXTENSION WORK AND PROPAGANDA MUST BE BASED ON INFORMATION GAINED FROM EXPERIMENT OR FROM EXPERIENCE BY AGRICULTURAL OFFICERS IN SIERRA LEONE

The year 1945 was, of necessity, one of consolidation and planning for the future rather than of further expansion. Thus, the rice seed distribution schemes were restricted and placed on a sounder basis; the mangrove-clearance loan scheme was given a breathing space to permit a careful check of existing participants; the indifferently successful communal farming of inland rice swamps was largely discarded in favour of individual farms; and a beginning made to restrict upland farming by law. Emphasis was placed on the use of house and farm refuse, compost and improved crop varieties to get intensive small holdings in inland swamps and valleys both in the rains and during the dry season, thus getting improved highly cultivated farms of smaller acreage but higher yields. Of the small experimental rice mills established in the Protectorate during the war, two have been shut down as offering no prospects, whilst two, showing promise, have received closer attention and are being put on a commercial basis. The preparation and inspection of such export crops as ginger and piassava received closer attention, involving reorganization of staff and preliminary redrafting of existing legislation which is inadequate.

Irrigation and drainage schemes, as a result of experience, are to revert for the present to experimental projects to provide data and a surer foundation before embarking on large-scale extensive schemes.

Special effort was devoted, with very encouraging results, to the organisation and extension of agricultural activities by the Native Administrations. Several new native administration seed farms were established, and existing ones were placed on a sounder basis. These farms are serving a very useful function which formerly had to be undertaken by the department. There was a further increase in the number of junior staff employed by the native administrations, under the guidance of the local Agricultural Officer, to give instruction along simple lines in improved methods of agriculture, such as swamp cultivation, the better care of tree crops and the correct preparation of export products including ginger and piassava.

SECTION II—THE WORK OF THE AGRICULTURAL DEPARTMENT

(a) ORGANISATION AND STAFF

8. The staff position, already unsatisfactory, was worsened by the retirement through ill-health of Mr. J. W. D. Fisher, Principal Agricultural Officer, and the resignation of Mr. H. A. Thompson, Agricultural Officer. There was one replacement, Mr. M. A. G. Hanschell, on transfer from British Guiana. Towards the close of the year there was promise of improvement, since realised by the arrival of three new Agricultural Officers on first appointment. In spite of every effort to recruit men to fill them, the key posts of Chemist (2), Marketing Officer, and Inspector of Produce remained vacant to the serious detriment of the work of the department. The retirement of Mr. Fisher, who had been invalided in 1944, was a heavy loss to the department, in which he had rendered consistently valuable service for twenty-four years, during which he had acted as Director on numerous occasions.

9. Mr. G. W. Lines, M.B.E., was promoted to fill the vacancy of Principal Agricultural Officer, and Mr. H. Macluskie was promoted to Senior Agricultural Officer. The Plant Pathologist, Mr. F. C. Deighton, acted as Principal Agricultural Officer until he went on leave in April, and Mr. Lines was seconded to the Supplies Department for four months as Acting Director of Supplies.

10. I visited the Gambia for three weeks in August when I assumed my duties as Agricultural Adviser. Agricultural Officers on first appointment are now liable for service in either Colony, and when the establishment of both departments has been brought up to strength Sierra Leone will also be responsible for staffing the Gambia.

11. In spite of staff difficulties, all departmental stations and farms were maintained; but this was possible only through officers undertaking extra duties. This they did most willingly and I wish to express my appreciation of the very loyal support and assistance I received from all members of the staff, both European and African. I mention, in particular, Mr. F. C. Deighton, who, as Acting Principal Agricultural Officer during the early months of my tenure of office, gave me invaluable assistance and advice; and Mr. G. A. P. Hamilton, first grade clerk, who in addition to his normal duties as chief clerk at head office, most efficiently undertook considerable additional work and responsibilities during the frequent absences, at the same time, of both myself and the Principal Agricultural Officer.

(b) AGRICULTURAL STATIONS

NJALA

12. *Crops*.—Crop experimental work was largely directed to upland pasture establishment and management, with a view to (a) the possible recuperation of degraded upland soil by rotational cattle grazing (b) the improvement of grass-land for cattle feeding (c) the selection of improved grass varieties, and (d) determining the productivity of pasture under rotational grazing. In addition the use of swamps to provide grazing during the dry season is being studied.

13. Grass trial results on the uplands confirm the 1944 figures that Guinea grass (*Panicum maximum*) is the most successful grass tried so far. It provided twice as much grazing and more fodder at an earlier date than Elephant grass (*Pennisetum purpureum*); and also recovered more quickly after grazing. Rhodes grass (*Chloris gayana*), both the creeping and the tufted strain, shows

promise. In the swamps the natural cover is *Panicum laxum*, a prolific, fine, short grass which survives flooding and stands close grazing. For comparison, plots of Guinea grass and elephant grass are being established in the swamps. Of the upland fodder legumes, *Pueraria phaseoloides* continues to be outstanding.

14. *Annual Crops*.—Observation plots of various annual crops, including new importations and locally selected varieties, were maintained. Of yams, Jaffna King and Chinese were the best quality, the former giving the highest yield. Three imported varieties and three local sections of ginger were also grown and will be multiplied for comparative trials. Other importations on trial include Castle Cary groundnut, Nigerian onions, yawa cowpea, soya bean, short-season beniseed, various grasses, tobacco, sweet potato and cassava. Forty varieties of upland rice were grown and the most promising selected for further trial.

15. *Permanent Crops*.—Yields from individual trees continued to be recorded in the established plantations of citrus, coffee and oil palm (Deli, Angola and Nigerian stock). The Angola palms are the most promising, and a pure line multiplication plot from the best tree is now coming into bearing. A large nursery of citrus and various economic and ornamental plants was maintained at Njala, as the main distribution centre for Sierra Leone.

16. *Livestock*.—The cattle herd flourished. During the year the herd was put on an experimental basis, selection being both on rate of growth and milk yield. It is hoped, by selection and good feeding, to raise improved strains as a foundation stock for further breeding both for beef and milk production.

17. *Pigs*.—Previously pigs had had a chequered career at Njala. Various factors such as inexperienced management, free-range in bush containing tsetse and too much dilution with native blood appear to have been the reasons for comparative failure. During the year pig-keeping was reorganised. A small stock of almost pure-bred Berkshires was kept entirely in pens on open ground. They were intensively fed, using rice meal and sweet potato tubers as the basis of the diet, supplementing with green food, palm oil, minerals and dried blood. Results have been most encouraging. Crossings are being kept to see how far pig-keeping on this system can be made to pay sufficiently well to be attractive to African smallholders. During 1946 it is hoped to introduce Nigerian Large Whites for comparison with the Berkshire stock.

18. *Sheep*.—Various methods of feeding were tried to improve the flock of sheep and to make them an economic proposition. Free grazing, rotational grazing and individual tethering were used but, under all treatments, the sheep were unthrifty. The local breed, apart from its slow maturity and poor conformation, does not even appear to be hardy. It is doubtful whether intensive stall feeding, even if practicable, would give any better results.

19. *Poultry*.—As in former years Njala has been the main R.I.R. breeding and distributing centre for the whole country. The stock is largely almost pure-bred R.I.R. and under careful management by trained men they thrive reasonably well. There is a big demand for eggs, chicks and adult birds, but until more is known about the local poultry diseases and they have been brought under control it is doubtful if much permanent improvement will result from the distribution. At the end of 1945 the poultry at Njala numbered 400; 6,926 eggs were produced during the year.

20. *Extension Work—Wet season swamp farming.*—Rice seed distribution and propaganda to induce individual farmers to adopt swamp rice growing was the main work. Concentration was made on selected swamps, with seed distribution limited to reliable farmers. This enabled closer attention to be paid by the limited staff available. The mass production of rice by communal swamp farming during the years of the war, although sound enough in theory, did not give the results expected. The post-war change over to intensive individual farming, although only gradual and less spectacular, is likely to produce more lasting and better results in the long run. Thus in the first year of this scheme, in the Bo-Pujehun districts, some 630 individual swamp rice farmers were established and planted 1,240 acres. In a few Chiefdoms of Pujehun district the farmers elected to remain on a communal basis using family units. This, as a voluntary communal effort, if it proves successful, will also be encouraged.

21. *Dry Season swamp Farming.*—Good progress is being made in the dry season use of swamps for such crops as sweet potatoes, cassava, maize, groundnuts, native greens and vegetables. This is done entirely by individual effort and the acreage under annual cultivation is increasing visibly. Enterprising women at Bo have successfully developed this type of market gardening to supply native foodstuffs which are railed to Freetown.

22. *Ginger.*—Towards the end of the year a campaign was started to improve the quality of ginger produced for export. Instructors toured in the actual producing areas and supervised the preparation of the crop for market, and produce inspection was tightened up at the buying centres.

ROKUPR

23. *Crops.*—Rice experimental work continued to be the main work of this station. The farm was made more compact by confining cultivation to the eastern bank of the Scarcies river. Outside the main empoldered area a further twelve acres of tidal swamp was stumped and laid out in half acre plots. The cultivation and comparative yield trials, within the empolder, were seriously affected by soil toxins, and on several plots the rice was completely killed.

24. *Soil Toxins.*—Prior to the empoldering of the farm no significant damage by toxins had been experienced. In all places where rice seedlings died, a brown deposit was found to occur, either on the soil surface or as a pan below the surface or as a sludge in the water. Water and soil samples from affected plots at Rokupr have been analysed by Dr. H. Vine, Agricultural Chemist, Nigeria, who reports that both contain considerable quantities of ferrous iron and sulphate with a *pH* value of 2.6 to 3.0. The suggestion is that the abnormal concentration of ferrous salts may be due to the exposure of fresh subsoil when the drains and empolders were made and oxidation following the introduction of aerobic conditions now that tidal water is excluded in the dry season. A full understanding of this problem and its cure must await the appointment of a soil chemist.

25. *Rice Nurseries.*—Wet and dry seed nurseries were compared. The wet nurseries gave an early start to the seedlings but later there appeared to be little difference in this respect. Resistance to *Piricularia* disease was the most marked difference and varieties which showed no disease in the wet nurseries were attacked when grown in the dry beds. The experiments will be repeated and elaborated in 1946.

26. *Rice Varieties*.—A collection of 86 varieties was maintained. These included selected and unselected local varieties, and varieties from French Guinea, Burma, Peru, Madras, British Guiana, Nigeria and Ceylon. Observations were kept on all these for growth, yield and resistance to *Piricularia*. Classification was done according to straw lengths and grain measurements and weights. Mass selections were made according to the flowering curves and single panicle selections were made for D.C. 39, Ngasein, Toma, Indo-China, India pa-lil and Kavungin-poothala with a view to isolating pure line strains.

27. The only variety yield trial unaffected by soil toxins was one with short-season varieties. The actual order of yields was lead, D. 99, D. 114, D. 110, D.C. 39 and Suduheenati H.F. 9. Of these, the first three gave significantly higher yields than the others whilst lead was outstandingly the highest.

28. Within the empolder, on blocks which recovered from soil toxins, Kavungin-poothala gave the highest yield (38 bushels per acre); whereas, outside the empolder, Bolo 108 and Ngasein were the best (34 bushels per acre).

29. *Purity of Seed*.—Due to lack of adequate supervising staff during the later years of the war, most of the Rokupr rices became very impure, chiefly by mechanical mixing. During 1945 careful roguing was therefore carried out at all stages of growth—on transplanting, at flowering, at harvest and on drying ground. Although this has greatly reduced impurities, further persistent roguing, combined with a resumption of pure-line selection work, will be necessary in the next few years.

30. *Economics of Rice Harvesting and Threshing*.—Detailed costs of harvesting and threshing by different methods gave indications that, taking such additional factors as transport into account, the present native system of harvesting and flailing in the actual field is the most economical.

31. *Other Experiments*.—A spacing test with G.E.B. 24 gave no significant differences whether the plants were four, six, eight or ten inches apart. An observation test (seed-broadcasting versus transplanting), using lead variety, gave no significant difference in yield.

32. The cultivation experiment was carried on for the second year under water control. This year only the plots cultivated every year were cultivated. Unfortunately one of the farm blocks on which this experiment is laid down was affected by toxins with the result that statistical analysis showed no significant differences between the treatments. That the failure to show a significant difference is due to this cause is seen if only half—the good half—of the statistical blocks are used in the calculation of results, when cultivation eight inches in February each year is significantly better than cultivation eight inches in July each year and very significantly better than all other treatments.

33. *Other Crops*.—Introduced varieties of yams, sweet potatoes and cassava were grown together with local varieties for comparison and to provide planting material for distribution to farmers. A citrus nursery is being expanded to serve the needs of the district whilst seedlings of Angola oil palm and Robusta coffee are being raised for the same purpose.

34. *Livestock*.—The only livestock at this station is a small herd of cattle. Their health has been good and there is no feeding difficulty. The bullocks have been used both for upland and swamp ploughing but, so far, without much success. Mechanical ploughing, which it is hoped will be tried in 1946, may be the solution in the Scarcies area.

35. *Extension Work.*—The main items of work were the distribution of seed rice and other planting material, supervision of native administration and departmental seed farms and the establishment of test plots in areas being reclaimed by the Irrigation and Drainage Branch.

36. During the year 5,526 bushels of seed rice were distributed under departmental and native administration schemes. This is a reduction of some 4,000 bushels compared with 1944 but is in accordance with the policy of reducing seed distribution to workable proportions and of limiting seed to the highest available quality.

37. Rice seed production and distribution is gradually being made the direct responsibility of native administrations. There are now three native administration seed farms, two of which were established in 1945. One was damaged by flooding but they are proving popular and effective.

38. 400 bushels of seed rice were purchased for the Department of Agriculture, Gambia.

IRRIGATION AND DRAINAGE PROJECTS

39. In the light of experience gained in 1944, it was expected that, with considerable constructional improvements, in Liding enlarged sluice gates, the three main Searcies reclamation projects at Rokupr, Lofi and Yakban would show successful results in 1945. It is regretted that these results did not materialize. The sluice gates could not cope with the heavy concentration of water at the height of the abnormal rains and in consequence areas were flooded too deeply and too long for the young rice. Bunds had to be cut and a proportion of the rice recovered, but it is clear that drastic replanning and further constructional alterations will have to be made before the problem is satisfactorily solved.

40. Test plots of rice were established by the Department of Agriculture in each of the three reclamation areas, but results were largely negated by flood damage.

41. *Rice Mill.* The small "planters" mill at Rokupr was handicapped by the shortage of spares and it was possible to mill only 1,417 bushels of paddy. It is intended to establish a larger mill, of the same type and capacity as the Freetown mill, at Mambolo as soon as the makers can supply it.

42. *Agricultural Liaison French Guinea.* Early in the year the Director of Agriculture, French Guinea, visited Rokupr and the Searcies and later a reciprocal visit was made to irrigation works in French Guinea by the Agricultural Officer, Rokupr. Both areas have problems in common, and exchange of ideas and information should prove beneficial.

SEMBEHUN

43. *Crops.*—Multiplication plots of swamp rice varieties were maintained, as were also upland plots of improved varieties of yams, groundnuts and sweet potatoes to supply planting material for distribution to local farmers.

44. Yields in the swamp rice plots indicate that Sughandi and Panianala give the best results.

45. The use of town refuse was continued, both with swamp rice and upland crops, with marked improvement in yields. In previous years, 5 tons per acre of town refuse had been given. This year it was increased to 15 tons, but there was no significant increase in yield.

46. *Extension Work.*—This, as in previous years, continued to be the main work of this station. In addition to the Mangrove Loan Scheme, work has been extended to the Bonthe riverain districts to cover piassava production, inspection and marketing. Since production of both rice and piassava is developing chiefly in this area, the Agricultural Officer, Sembahun, moved his headquarters to Bonthe at the end of the year.

47. *Mangrove Loan Scheme.*—Mangrove clearing is progressing well, particularly in Bendu Chiefdom, an encouraging feature being the way in which established farmers are extending their clearings and new farmers starting on their own initiative. During 1945 new loans were purposely curtailed and concentration made upon improving existing farms.

48. During 1945, loans of £41 were made to nine farmers only, making the total since the Scheme began 930 farmers with advances of £4,032. The total acreage cleared is estimated at 4,550 acres of which 3,300 acres are now being farmed. In addition, a conservative estimate gives 120 farmers who have cleared a further 500 acres on their own initiative.

49. Repayments of loans are coming in satisfactorily, £1,621 having been repaid by the end of 1945. Yields have been excellent; no serious difficulties from soil toxicity or excessive flooding have been experienced; with a few exceptions farmers are keen, and the stage has now been reached when steady expansion on sound lines is assured.

50. In accordance with policy, seed rice distribution was curtailed and 730 bushels only were distributed under departmental and native administration seed schemes.

51. The Irrigation and Drainage Branch began surveys of areas between the Ribbi and Bumpe rivers and of a large inland swamp near Shenge with a view to improving these areas for rice growing.

52. *Piassava.*—Prior to the war, as a result of the work of the Agricultural Department, the quality of piassava in the Bonthe district had been raised to a high standard, and only prime Sherbro quality was exported from Bonthe. Piassava extension work had to be abandoned during the war years, and, in consequence, quality deteriorated. A comprehensive scheme, on an intensive scale, has now been put into operation throughout the Bonthe district in order to ensure that only prime Sherbro quality is again produced. Instruction in correct methods of cutting, retting and preparation are being given in all the main producing areas whilst stricter produce inspection has been organised at the chief buying points. First results are encouraging. The scheme also provides for the training of additional instructors and inspectors, largely ex-servicemen, who will be available for transfer to work in the Sulima area when the department is ready to start similar work there.

MAKENI

53. *Crops.*—The main farm and sub-stations continued as a demonstration of improved methods for utilising inland swamps and the adjoining uplands, in addition to their other functions which include the testing of new and improved varieties of crops and the production of seed and planting material for distribution to farmers, and the training of junior Agricultural Staff for native administrations and the Department of Agriculture.

54. A maintenance of fertility observation test has been laid down on five selected swamp plots which are to be farmed uniformly over a number of years. Rice (Sugham) is to be planted annually during the wet season on all plots. Dry season cropping will be:—

- Plot 1. Fallow
2. Native Garden (mixed vegetables)
3. Sweet potato (Mississippi variety)
4. Cassava (coco variety)
5. Maize and cowpeas (black-eye).

The rice straw on half of each plot will be burnt, while on the other half it will be dug in during preparation of the plots for the following dry season crop. None of the plots will receive manure or compost. Results should show whether or not it is possible to maintain fertility on this system, without the use of manure or compost. The first crop of rice from these plots has been harvested, giving good yields as follows:—

- | | |
|---------|-----------------------|
| Plot 1. | 63 bushels per acre |
| 2. | 62 " " " |
| 3. | 48 " " " |
| 4. | 31 " " " |
| 5. | 37½ " " " |

55. On the sloping uplands bordering the swamp, permanent tree crops including citrus, kola, cashew, oil palm, avocado pear and coconut were planted in strips across the slope in 1942 and 1943. At the beginning, the land was in poor heart and a cover crop of Pueraria was established throughout the trees both to stop erosion and to help to raise fertility. In 1944, rows of cassava and pigeon peas were planted on either side of each row of trees, primarily as a wind-break and shade for the young trees. In 1945, the Pueraria between the tree strips was dug in and various annual crops grown; the Pueraria actually in the tree rows was left as an anti-erosion measure and allowed to spread again over the whole area after the various annual crops had been harvested. This treatment will be continued over a period of years to test its effectiveness in maintaining fertility.

56. It is hoped that the results of these trials and of others incorporating the use of farm yard manure and composts and of grass fallows will lead to the evolution of stable systems of intensive agriculture to replace the present wasteful methods of farming the uplands.

57. During the year observation plots were planted with yams and sweet potatoes, using various dressings of dung, compost and town refuse, both singly and in combination with sulphate of ammonia: but results, so far, are inconclusive.

58. The distribution of planting material continued and included the following:—

Citrus plants 678, coconut seedlings 215, Pineapple plants 516, Angola oil palms 275, Yams 4,532 lb., and seed of improved varieties of tobacco and vegetables.

59. During the year new introductions were tried on the farm with a view to future multiplication and distribution if any prove suitable. These introductions included East African millets, Jerusalem pea, clay-coloured cowpea, Poona beans, Yawa cowpeas, Nigerian groundnuts (Samaru 38 and Castle Cary), and

soya beans (Trinidad, Malaya and miscellaneous). These will have to be grown a few more years yet before any definite conclusions are possible. Of previous introductions, Mississippi sweet potato, due to its quick maturity and heavy yield, is proving the ideal dry season potato for swamp cultivation; Blue Mountain coffee has done fairly well and may prove the right type for the higher altitudes; fair crops have been obtained from tobacco seed introduced from Nigeria; the introduced cinchona is having a hard struggle due to heavy rains and termite damage. Of the ten varieties of rice tried in the Makeni area, Sughandi, Lead and Ro 1 have been outstanding, the first two being in very popular demand amongst farmers. Cassava introduced from the Gold Coast in 1944 shows no improvement on existing varieties.

60. *Black Pepper*.—A small plot of black pepper (*Piper nigrum*) has been maintained and has grown very well. Analysis of samples sent to the Imperial Institute show that the composition of the pepper differs from the accepted United Kingdom standards. The present crop will be sent to the United Kingdom for confirmatory analysis. Improved cultural methods and trials at a greater altitude may change the composition but it is possible that the parent plants are of inferior quality.

61. *Farm Economics*.—Costings are being kept on selected plots of the Makeni swamp farm to show the cost of production of wet and dry season crops.

62. *Livestock*.—A small herd of cattle was maintained, one of which died from bovine pleuro-pneumonia and one from snake-bite. Selection of native fowls (Kibu type) is being carried out with a view to crossing with Rhode Island Red.

63. *Extension Work*.—As in previous years the basis of all extension work has been propaganda and demonstration to induce upland farmers to adopt swamp farming. Hillside farming particularly round the main centres of population, is still very widespread. Degradation of soil and vegetation is going on at an increased rate, and the danger of erosion and serious reduction of water supplies in the dry season is very real.

64. To encourage farmers to leave the uplands and to adopt swamp farming a scheme has been laid down to start in two chiefdoms (Sella Limba and Kunike Barina) in 1946. Money from the Protectorate Mining Benefits Fund will be utilized to clear swamps. After clearance, the swamps will be divided into one-acre plots which will be rented by farmers. Legislation has been drawn up by the Native Authorities to protect tenants and ensure proper working of the schemes, under the supervision of the Agricultural Officer and the District Commissioner. This scheme, like the Mangrove Clearing Scheme, should be capable of expansion and should make a real contribution to soil conservation, especially if it is accompanied by the introduction of legislation to prohibit farming on steep slopes.

65. The distribution of seed rice of improved varieties continued, and during the year 2,128 bushels were supplied to farmers through departmental and native administration schemes. 4,532 lb. of seed yams were also distributed.

66. New departmental sub-stations were opened at Kabala and Makali as the first step to fostering agricultural development in the Koinadugu district and in the plateau area of the Bombali district.

67. Eight native administration seed farms were maintained and one new one was started. These farms are serving a most useful function in that they not only demonstrate better methods of utilising swamp lands and the adjoining uplands but also undertake the trial, multiplication and distribution of better kinds of rice, root-crops, economic trees, fruits and vegetables. They are financed and staffed by the native administration under the direction of the Agricultural Department.

KENEMA

68. *Crops*.—As in previous years the farm has continued as a centre for training junior agricultural staff, experimenting in swamp management, livestock rearing and for the distribution of seed-rice and other planting material in demand locally.

69. *Livestock*.—There was a serious deterioration in the standard of the pig herd (Berkshire-native cross). This was partly due to feeding difficulties and heavy infestations of worms but the biggest factor appears to have been an excessive proportion of native blood. The herd will be disposed of and a fresh start will be made with a small foundation stock of pure-bred large whites.

70. *Extension Work*.—During the year a practical start has been made, in the Nongowa chiefdom, to a scheme which, if successful, should have far-reaching effects upon upland soil conservation not only in the Kenema district but eventually, as it can be applied, throughout the country. On the initiative of the Forestry Department, legislation had been introduced to enable any tribal authority to prescribe an area as a "Soil Conservation Area" within which the cutting and burning of vegetation may be prohibited or regulated, and in which the tribal authority may prescribe the manner in which the farmer shall cultivate the land. This legislation is now being enforced in the Nongowa chiefdom to the extent that all the steeper hills, which were not already under forest reserves, have been prescribed as areas in which farming is prohibited except with the special authority of the tribal authority acting on the advice of the Soil Conservation Committee, which includes the District Commissioner, and the Forestry and Agricultural Officers.

71. With the prospects of effective action being taken to reserve certain upland areas, increasing efforts will be made to induce farmers to make better use of the swamps. As elsewhere, the emphasis is now being made upon individual farms rather than upon communal swamp farming. Thus in the Kailahun district, whereas in 1944 there were 451 communal farms and only 145 individual farms, in 1945 there were no communal farms but 1,424 individual farmers, with a resulting increase of over 800 bushels of seed rice planted.

72. Continuing the policy of encouraging native administrations to accept responsibility, under the guidance of the Agricultural Officer, for proved agricultural work, practically all seed rice distribution was transferred to native administrations. Thus eleven native administrations in the Kenema division now operate their own revolving seed schemes whilst nine of these have native administration seed farms selling seed direct to farmers. A new plan has also been put into operation whereby each native administration will have its own Agricultural demonstrator or demonstrators who will be paid from native administration funds. These men are trained by the Agricultural Department at the Kenema Farm and are then returned to their own village areas and given simple, specific work such as seed distribution, cocoa propaganda and rice planting. This is easing the staff situation and gives native administrations an added interest in agricultural development.

73. There are now nine native administration seed farms which provide both demonstration in the use of valley swamps and a supply of seed and planting material for local distribution.

74. Kenema division includes the chief cocoa-growing areas of Sierra Leone and has also a good coffee production. During the year a drive was made to encourage the owners of cocoa plantations to bring them back into productive condition after the semi-stagnation due to low prices during the war years. The continued low price for cocoa, however, has discouraged farmers and interest will not be revived until the price improves.

75. *Cocoa diseases and Pests*.—Monkey damage, as a result of firearm scarcity, has affected the yields of all crops but has been particularly severe in the case of cocoa. Strong representations have been made repeatedly for import of guns, caps and powder to be speeded up but, so far, little has resulted.

76. An Entomologist (Mr. F. A. Squire) from the West African Cocoa Research Institute made two visits to the Kenema cocoa area during the year with the object of studying the capsids *Sahlbergella* and *Distantiella*. Both insects were conspicuously rare, and the Entomologist reported that the cocoa appeared extremely healthy and that the only pest of any consequence was a coleopterous twig borer. He also confirmed previous observations that there were no signs of Swollen Shoot or Witchbroom.

77. *Rice Mill*.—The small "planters" mill at Kenema, which up to 1945 had been worked with indifferent success, is now showing definite promise and towards the end of the year was working to capacity. Parboiling was done at the mill and a good grade of milled rice produced. 43 tons of milled rice were produced to meet the needs of local non-producers. In addition, a few large rice farmers, for the first time, made use of the mill to hull their paddy. This is being encouraged and the economics of the mill are being studied with a view eventually to establishing an African as millowner.

NEWTON

78. *Crops*.—Investigations into the best methods of farming degraded upland soils continued. Intensive treatment incorporating the use of composts, farmyard manure and grass fallows, together with contour cultivation and bunding, are giving promising results. A barren and leached piece of land was contour-ridged and planted with *Andropogon gabonensis* after a light dressing of sulphate of ammonia and superphosphate. A natural cover of grasses and weeds is now forming, and with the addition of *Pueraria* the land is expected to be regenerated in a few years.

79. *Composts*.—Compost-making trials were started using the grass *Chasmodonium caudatum*, one of the commonest natural grasses found on denuded uplands.

80. *Pastures*.—A start was made with establishing blocks of Guinea grass to provide fodder and grazing for the cattle. Other kinds of promising local and introduced grasses will be planted in 1946.

81. *Valley Cultivation*.—Intensive valley cultivation continued with rice in the rains and vegetables and other crops under irrigation in the dry season.

82. *Terracing*.—An attempt was made to grow vegetables during the rains by terracing the uplands. The rain, however, was too much for the terraces and serious erosion began. The beds were then levelled and bunded. Satisfactory results were obtained and erosion was stopped. The soil was poor but, judging by the year's experience, bunding plus intensive treatment using compost and farmyard manure should restore fertility to a high level.

83. "*Nigerian*" *Onions*.—The only type of onion normally grown in Sierra Leone is the native shallot. Ordinary onions are imported from South Africa and elsewhere and are in great demand at high prices. If ordinary onions could be grown and form seed in Sierra Leone they would form a valuable addition to the diet and a good new market garden crop. Accordingly, seed from Nigeria was obtained. At Newton, planted on heavily manured uplands at the end of the rains, the crop did well and further planting is to be done under irrigation during the dry season. Similar results have been obtained at several other stations. So far, however, none has produced seed. It remains to be seen if the dry season crop will produce seed in any part of the country. Unless seed can be produced in Sierra Leone it is unlikely that a large-scale industry can be developed.

84. *Permanent Crops*.—Yields from the upland fruit trees were variable, due partly to the season. Genoa lemon cropped heavily, but other citrus, after the previous good season, were disappointing. In contrast, the introduced varieties of mango which bore nothing in 1944 have done very well after mulching and dressing with manure. Angola oil palms were planted to provide a source of seed for distribution.

85. Cinnamon bark was prepared and sent to the Imperial Institute for report. Apart from the criticism that the samples were not in the correct marketable form the report was favourable.

86. *Maswari—Reclamation of Saline Swamps*.—These test plots were designed to investigate the possibility of growing rice on cleared littoral mangrove swamps. The whole area is empoldered, with controlled water supply. As a result of complete rice failure in 1944 it was clear that a complex problem concerning several interrelated soil and water factors was involved and that a full chemical investigation would be needed. Unfortunately no chemist was available. Pending the arrival of a chemist, various cultural trials were made including improved drainage, application of farmyard manure, shallow cultivation at different times, cultivation on mounds, and no cultivation. In addition different rice varieties were compared. Of these measures, digging to 4" immediately after harvest and planting on mounds give most promise, and Sughandi has proved to be easily the best variety under local conditions. Drainage and manuring gave inconclusive results. The general results, however, are disappointing although yields have improved. It is hoped that a soil chemist will be available in 1946 to investigate the problem.

87. *Livestock*.—During the year there were welcome signs that both pig and rabbit breeding are likely to be successful.

88. *Pigs*.—There is a large local demand for pigs for breeding purposes and 1945 results at Newton, in which good feeding and management and ruthless culling of inbred stock are producing a quick maturing economical type, justify expansion. A breeding stock is being built up concentrating upon Middle and large white crosses. Large white boars and sows are being obtained from

Nigeria and other white stock has been bought locally from service piggeries. Experience shows that with good feeding, and by keeping the pigs in styes away from bush where tsetse fly occurs, the danger from *Trypanosomiasis* should not be great. To make certain, however, the imported Nigerian animals will be housed in fly-proof pens.

89. *Rabbits*.—Started in 1944 at Newton, as a small private hobby, rabbits from St. Helena multiplied to 40 during 1945, and have provided a basic breeding stock for other stations. As with pigs, there seems no reason why rabbits of the right type, with careful management and correct feeding, should not thrive in Sierra Leone. A scheme has been planned for a limited distribution in 1946 to selected farmers near Newton. They will be under close supervision and should the scheme go well it will mean a welcome addition both to the nutrition and economy of the native smallholder. It is hoped to import new stock (Flemish Giant) during 1946.

90. *Poultry and Ducks*.—Disease and thieving made poultry-keeping a difficult proposition. Despite this, 33 fowls and 376 eggs were distributed for breeding. Ducks, kept in pens until late in the year, showed no increase until they were allowed free range.

91. *Extension Work*.—Supervision of market gardens in the Colony valleys, advice to Services' gardens and rice seed distribution in the Colony and Koya chiefdom continued to be the main work. The Hastings military garden, after making a profit of £2,300 during the year, finally closed down and the land was handed back to the owners, many of whom have lost no time in continuing vegetable growing there. Seed rice distribution totalled 980 bushels, and there was very considerable increase in the acreage of swamps under cultivation.

TEKO STOCK FARM

92. The promising start made in 1944 in cattle selection and breeding based on milk yields received a severe setback in 1945 as a result of an outbreak of contagious Bovine Pleuro-pneumonia. The outbreak started in February, and by the end of the year had reduced the herd of stock by approximately one-third. Every possible preventative step was taken, including inoculation with Gold Coast vaccine at quarterly intervals. The Veterinary Department is now arranging for a test using vaccine produced in the Gambia.

93. Some losses were also caused by fly worry and purulent Endometritis. Fly worry is mainly due to *Stomoxys calcitrans* which can in the space of a few days cause complete exhaustion and death.

94. *Milk Records*.—Distinct improvement both in milk yield and length of lactation was shown, as follows:—

	1944	1945
Average length of lactation	152 days	203 days
Maximum length of lactation	296 days	333 days
Average weight of milk per lactation ...	390 lb	722 lb
Maximum weight of milk per lactation ...	860 lb	1,873 lb

It is expected that these figures will be still further improved upon.

95. *Butter Production*.—332 lb of butter and 61 lb of cream were produced. Although this is on a small scale, it represents a new departure in Sierra Leone and may well expand.

96. *Feeding Trials*.—Feeding trials of milking cows, in-calf cows and young calves were carried out. A standard ration for calves from two weeks to three months (weaning) was evolved as follows:—

Maize meal 10 parts, groundnut meal 10 parts, blood meal 4 parts, bone meal $\frac{1}{4}$ part, salt $\frac{1}{4}$ part. The mixture is fed at the rate of 1 lb. per head per day, in addition to skim milk at the rate of $1\frac{1}{2}$ lb. for each 10 lb. liveweight.

Feeding trials with milking cows continued.

97. *Small Livestock*.—Sheep, goats and pigs were kept for observation. The pigs unfortunately, after making a most satisfactory beginning, all died from some form of poisoning. The sheep have not done well and there were many deaths due to worm infestations and plant poisoning. They appear to be a degenerate form of the fat-tailed Persian type. It is unlikely that much improvement can be made by selection. Local goats are a better proposition. They are very hardy and easy to feed. They have distinct possibilities as milk-producers, one goat at Teko yielding $69\frac{1}{2}$ lb. of milk in a lactation of 104 days.

98. *Crops*.—A variety of upland and wetland crops and grasses were grown to provide food for the livestock.

(c) RESEARCH

PLANT PATHOLOGY

99. The Plant Pathologist continued to act as Principal Agricultural Officer until he proceeded on leave in April. It was not until his return from leave in November that he resumed his substantive duties. For this reason, apart from routine collections and inspection of citrus plantations for scab, no other work was possible during the year.

ENTOMOLOGY

100. In the absence of the Entomologist, Mr. F. A. Squire, on secondment to the West African Cocoa Research Institute, the Laboratory Assistant, Mr. Wellington, continued to carry on with the routine duties of the section throughout the year in addition to supervising operations connected with the Citrus Moth Investigation until its close on 31st July.

101. *Rice*.—The mole cricket, *Gryllotalpa africana*, made its annual appearance in the newly transplanted rice plots at Sembahun Agricultural Station in May to July, destroying a number of seedlings. A poison bait (rice bran, sodium fluosilicate, sugar, and water made into flat cakes) gave promising results under field trials, which will be repeated this year.

102. In May, a dynastid beetle, *Heteronychus* sp. was reported attacking tidal swamp rice in parts of Bonthe district; the position will be investigated in 1946 if there is a recurrence of the attack.

103. *Cocoa*.—In connection with the search for parasites of the capsid bugs of cocoa (*Sahlbergella singularis* and *Distantiella theobroma*), Mr. F. A. Squire, Entomologist, West African Cocoa Research Institute, Gold Coast, paid two visits to Sierra Leone in April and November respectively. No capsids were found in April, while in November they were just beginning to appear on cocoa.

104. *Citrus*.—Two of the scale pests of citrus, *Lepidosaphes beckii* and *Prontaspis citri*, were effectively kept in check by spraying affected trees with sulfinette (lime-sulphur) at a strength of 1 : 40.

105. *Cattle Pests*.—In August/September a few deaths occurred among cattle in the Government Stock Farm at Teko, and at Bumban, due to attacks by the biting fly *Stomoxys calcitrans* which, in some cases was found breeding in cow dung inside the "warris." In collaboration with the Veterinary Officer, the usual control measures—removal of cattle from infested areas, cleaning of warris, etc.—were carried out with satisfactory results.

106. *Citrus Moth Investigation*.—The following is a brief report on work done up to 31st July. The number of night collections was 141, and the total number of moths caught was 9,383, of which 8,894, or 97 per cent, were caught during the period April to June, which includes the peak of fruit moth incidence in Sierra Leone. *Achaea* species again predominated, the ten species recorded accounting for 4,064, or 43 per cent, of the total number of moths caught.

107. In addition to the regular adult food plants—citrus, mango, cashew, etc.—fruits of the following, which appear to be new adult food plant records, were attacked by moths—*Gmelina arborea* and *Spondias mangifera*. The former is an exotic shade tree while the latter is an edible fruit tree commonly planted in the Colony villages.

108. New records for larval food plants are as follows:—

MOTH	FOOD PLANT
<i>Achaea boris</i>	<i>Combretum comosum</i>
<i>Achaea catella</i>	<i>Phyllanthus discoideus</i>
<i>Achaea trapezoides</i>	<i>Phyllanthus discoideus</i>
<i>Anua mejanesi</i>	<i>Deinbollia pinnata</i>

Parasites were very few and consisted only of one Ichneumonid and a small number of Braconids.

109. *Reference Collection*.—The eight lots of specimens returned after identification from the Imperial Institute of Entomology include many species new to Sierra Leone.

110. A Bruchid beetle sent from the Gambia and reported as attacking stored groundnuts in that Colony, proved to be *Caryedon fuscus*, Goeze, which has not yet been recorded in Sierra Leone.

(d) RICE MILLING

111. The control of the Government Rice Mill at Cline Town continued to be the responsibility of the Director of Supplies who had taken over from Department of Agriculture in 1944. The mill was worked to capacity and 73,416 bushels were milled or re-cleaned.

(e) PRODUCE INSPECTION

112. Mr. C. G. White, Assistant Inspector of Plants and Produce, was in charge of the produce inspection branch throughout the year. He supervised a staff of fourteen sub-inspectors stationed at the main produce centres throughout the country.

113. The end of the war made it possible for inspection staff, which had been largely concerned with work in connection with local food supplies and palm kernel production, to revert to their normal duties of produce inspection. Consequently, in the latter half of the year it was possible to reorganise and tighten up inspection of export produce. During the past few years various factors had resulted in a serious deterioration in quality of produce, non-essential to the war

effort. This was particularly so with ginger, cocoa and piassava. In anticipation of an increased demand for these products in the post-war years a drive was started, towards the end of 1945, to raise the quality of these products to, at least, accepted pre-war standards.

114. The tonnages of produce exported in 1945, the bulk of which was inspected, was as follows: figures for 1938 and 1944 are shown for comparison: --

				1938 Tons.	1944 Tons.	1945 Tons.
Palm Kernels	...	...	...	63,697	45,643	47,314
Piassava	...	...	...	3,791	1,264	1,170
Ginger	...	...	...	2,705	1,902	967
Cocoa	...	...	...	384	831	352
Beeswax	...	...	...	3,472 lb.	9,840 lb.	9,510 lb.

(f) AGRICULTURAL EDUCATION

115. The training of agricultural instructors continued at the Njala Training College, now in its seventh year. Agricultural teaching was in charge of Mr. T. P. Wheldon, Agricultural Officer, from January to May and on his return from leave in November. From May to September, Mr. G. C. Taylor, Agricultural Assistant, was in charge until he proceeded to Trinidad to take the two-years' associateship course at the Imperial College of Tropical Agriculture. Mr. M. A. G. Hanschell, Agricultural Officer, was posted temporarily in charge of the course at the end of September until Mr. Wheldon's return.

116. During the past two years the educational standard of applicants for the college, particularly amongst agricultural students, has risen considerably.

117. The following details of the course followed during 1945 are given.

118. *Agricultural Course.*—The first year of the Agricultural course ended in May, when examinations were held in the following subjects:—Soils, biology, elementary mathematics (including geometry), English, general paper of an agricultural nature; and an oral examination on the practical work done throughout the year's course.

119. Of the sixteen who sat for the examination, fourteen reached the required standard. Two failed, and their scholarships were terminated. The two vacancies due to the termination of these scholarships have been filled.

120. The second year of the course commenced after the mid-year break. The syllabus for the second year provides for instruction in soils, crop husbandry, dealing with the chief crops grown in Sierra Leone and their preparation for the market; elementary zoology, with particular attention to the reproductive and digestive systems of domestic and farm animals; farm management; nursery technique and practice; surveying and building. Lectures were given in the above subjects, and a large percentage of the time was devoted to practical work, especially in nursery practice and surveying and building. Terminal examinations were held at the end of the year, and the results were, on the whole, satisfactory. The course continues.

121. During the Christmas vacation, the agricultural students each carried out a detailed agricultural survey of a small area around their home towns and villages.

122. The work on the farm was carried out throughout the year under the supervision of the students. Each month, a student bailiff is appointed, who with the aid of a student overseer for each section of the farm (poultry, permanent crops, annual crops, nursery, etc.) organises the labour throughout the month, being allowed a fixed amount of money to be spent upon labour each month. This is under the supervision of the Agricultural Officer and the Agricultural Instructor. The students who were not in office worked as labourers on the farm for three hours each day.

123. On the farm the system of soil regeneration under Elephant grass was continued. The first annual strip, which has been under Elephant grass for five years, was cropped with annual crops; rice being grown between yam ridges, pigeon pea between yam ridges, and pigeon pea between cocoyam (*Tania*) ridges. Part of the strip was cultivated in native fashion; rice, beniseed, maize, guinea corn and okra being grown intermixed. The yields were satisfactory. A reserve area, on which now stand the new dormitories, was also cultivated. This land has been under a leguminous cover crop (*Centrosema*) since 1939. Rice, ground-nuts, maize and pigeon peas were grown to supply poultry feed. A demonstration plot of seventeen varieties of upland rice was established. The nursery and vegetable garden was increased, and fresh vegetables were supplied to the College Mess. The sixth annual strip, which was cropped in 1944, was put down to elephant grass. Of the permanent strips, oil palms and bananas gave a satisfactory yield, while the citrus and mixed fruit strips have started bearing. The coconut strip is not progressing well, conditions not being suitable for this crop. The area under coffee was increased, *robusta* and *stenophylla* being the species planted.

124. The poultry section was reorganised. Previously, the fowls were allowed free range. Owing to the damage caused in the nursery and vegetable garden by the fowls, and the difficulty of checking egg production, the fowls were enclosed in runs. Runs were erected, partly of wire-netting and partly of bush sticks and bush rope. There were some deaths due to bush-cat and hawks, and two cases of Fowl Typhoid were recorded. There has been an improvement in the egg production this year.

125. Each student (Agricultural, Education and Forestry), had his own garden, the greater part of the planting materials being supplied by the College nursery.

IRRIGATION AND DRAINAGE BRANCH

126. The staff position was unsatisfactory, the European establishment falling from eleven to five during the year. Mr. C. J. Rae, Chief Irrigation and Drainage Engineer, was in charge of the branch throughout the year.

127. New surveys, covering an area of about 18,000 acres, were started in the Ribbi littoral area near Shenge. The collection of hydraulic data for all the major rivers in the Protectorate was continued.

128. Construction work, including the internal drainage system and the enlargement of sluices, was continued in connection with the areas previously empoldered at Yakban, Luti and Rosino in the Great Scarcies River. Unfortunately the expectation of successful results in 1945 was not realised. The sluice gates failed to cope with the floods which accompanied the abnormal rainfall in the earlier part of August and the bunds had to be cut to release the water which had accumulated within the empolders. Most of the rice which had been planted before the flooding was killed.

129. Good progress was made with bund construction at Robis in the Little Scarcies River, and in connection with the new road system linking Rokupr with Mambolo, Mando and Mange. At Rokupr, houses for the resident engineer and foreman, as well as a rest house and African staff quarters, were completed; and the workshop and stores at the wharf were enlarged.

130. On account of the continued failure of the Scarcies projects to work satisfactorily, Government decided to call in a consulting engineer. He arrived from the United Kingdom in December and in due course submitted his recommendations which were accepted and will be put into effect in 1946.

I have the honour to be,

SIR;

Your obedient servant,

R. R. GLANVILLE,

Director of Agriculture.

DEPARTMENT OF AGRICULTURE,

NJALA, VIA MANO.

20th June, 1946.

